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Role of Technology Innovation in Economic Growth: A Bibliometric Analysis

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Abstract: Economic growth is a metric used to measure a country's development and advancement. Technological innovation is a driving force behind economic growth and helps to improve and modernize industrial techniques. Thus, this study aims to synthesize existing research on the impact of technology innovation on economic growth from 2010 to 2024 through bibliometric analysis. 414 documents were extracted from the Scopus database and then analyzed through the BiblioShiny software. This review provides insightful information on the background of technological innovation and its impact on economic growth and analyses data according to publication patterns, sources, documents, authors, nations, and keywords. The results indicate a rapid and remarkable growth (28.91%) in this field, suggesting that interest in this field has increased noticeably. China emerges as a leader in terms of research production, citations, and partnerships when national contributions are examined. China is also a keyword that is frequently used in related literature. Sharif A. and Liu J are the most influential authors in terms of citation and publication respectively. Jiangsu University is the top institution, and "Environment Science and Pollution Research" is the top source that has contributed the highest number of articles in this field. Various bibliometric studies have been carried out to explore the concept of technology innovation in different facets and contexts, but economic growth through the lens of technological innovation remains unexplored. Thus, this study advances our knowledge regarding the influential role of technology innovation in economic growth by using a bibliometric lens to examine the literature, identify knowledge gaps, indicate areas requiring more research, and highlight the potential for progress. These findings will have significant implications that can greatly benefit researchers, decision-makers, and professionals in crafting policies and focusing on infrastructure development to support technology innovation. This bibliometric study concludes with limitations and recommendations for further study.

Introduction

According to (Dolores et al., 2014), "Technological innovation is a set of technical, industrial, and commercial stages that lead to the launch of manufactured and commercial products and new technical processes". There are two categories of technical innovation: process innovation, which is the design of a new process or the improvement of an existing one, and product innovation, which is the introduction of a new product or the improvement of an existing product. Today, countries rely on modern technology to remove barriers and improve work efficiency. This involves focusing on research and development to keep up with developments and adapt to challenges. In the age of the technological revolution, countries that depend on traditional ways will not be able to sustain their current level of performance, no matter how capable they are. Therefore, nations are forced to rely on technical innovation, which is one of the most crucial foundations supporting the economic growth of nations (Mohamed et al., 2022). It is commonly recognized that technological innovation is the main force behind economic growth. Technological developments have raised living standards, spurred

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economic growth, and created jobs by modernizing industrial processes, creating new sectors, and increasing productivity (Imdadullah, 2023).

Technological innovation has contributed to a country's economic growth and sustainable growth through e-commerce, artificial intelligence, e-vehicles, fintech, telemedicine, and many more. The growth of e-commerce stimulates investment agglomeration, increases urban entrepreneurial vibrancy, and creates financial guarantees and conducive social environments for the development of green innovation (Wang et al., 2023). By 2026, the e-commerce sector in India is expected to grow to 200 billion US dollars, which would double the country's GDP from 125 billion to 250 billion (Srivastava and Singh, 2023). Artificial intelligence (AI) has the potential to both directly and indirectly stimulate economic growth by boosting market demand for human capital and technology innovation (Tolulope et al., 2024; Xian, 2023). China and the US are experiencing significant economic growth due to AI development, with the US benefiting more from greater levels of AI development (Liu et al., 2023). In healthcare, telemedicine is a great technological innovation that helps to increase people's productivity by enhancing access to healthcare without compromising their work. The telemedicine market has drastically grown after covid-19 (Shweta et al., 2024). FinTech also significantly fosters economic growth by expanding financial inclusion (Badwan and Awad, 2022; Bu et al., 2023; Shen, 2022). Research indicates that China's economic growth increased by 8% with a 10% increase in fintech (Bu et al., 2023). Similarly, fintech improves Singapore's economic development by decreasing interest rates, improving the experience for investors and consumers, and encouraging development in both investment and consumption (Huang et al., 2023). Automotive markets such as e-vehicles also contribute to economic as well as sustainable development (Prushkivska et al., 2024). Adoption of electric vehicles has both beneficial and negative effects on economic growth, but the positive effects are more favorable for the economy (Seth et al., 2023). It is part of green technology innovations and it helps to reduce fuel consumption, noise pollution and CO_2 emissions and improve the environment to promote sustainable development (Oubnaki et al., 2024). A balance between economic growth and environmental protection can be achieved through green technology innovation, where government subsidies and environmental regulations play a significant role in encouraging enterprises to engage in green technology innovation (Liu et al., 2020). G-20 countries also have economic growth due to Information and Communication Technologies and innovation (Nguyen et al., 2020). Past research has also confirmed this association of technology innovation and economic growth in the context of BRICS economies (Su et al., 2021) and Asia-Pacific Economic Cooperation countries (Zafar et al., 2021). Previous studies emphasize that China needs to shift from imitation to innovation for sustainable economic growth (Zhou et al., 2021). An open market economy and a sound economic system are the most suitable environments for the development of technology innovation industries (Li, 2023). Studies have recommended that the economies should focus on increasing R&D investment to promote technological innovation, ultimately leading to economic growth (Y Liu et al., 2023; Mohamed et al., 2022).

Overall, the literature reviewed emphasizes the importance of technology innovation in driving economic growth while considering environmental sustainability. The studies highlight the various factors influencing this relationship, such as government subsidies, environmental regulations, Information and Communication Technologies, and digitalization and focus on increasing R&D investment to enhance technology innovation. Decision-makers can use these findings to adopt policies that promote economic growth while minimizing environmental impact.

Numerous review articles have been produced to summarise the body of knowledge in the field of technological innovation. The majority of these studies concentrate on particular facets of technological innovation, such as low-carbon technology innovation (Xu and Liu, 2024), sustainable technology innovation (Zhang et al., 2020), and Green Technology innovation (Qing et al., 2022). Technology innovation significantly affects many industries, improving production, efficiency, and customer experiences. Many bibliometric studies have been conducted to assess the role of technological innovation in different sectors such as the food industry (Castillo-Vergara et al., 2021), small and medium enterprise (Budianto et al., 2023), Electric vehicles (Chen and Chen, 2023), healthcare industry (Cobelli and Blasi, 2024), manufacturing industry (Judijanto et al., 2023), textile industry (Wang and Cheng, 2022). The impact of technological innovation on overall economic growth has not been explored. The rapid growth of research in technology innovation makes it difficult to address all elements in a single review paper, leading to a lack of comprehensive literature review. Thus, this study aims to address this research gap by conducting a bibliometric analysis to synthesize the literature that states the importance of Technology

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Innovation in Economic Growth. The following research query has been formed to address this research gap.

RQ1 What are the publication patterns and key trends in the literature related to technology innovation and economic growth?

RQ2 What are the most influential sources, affiliations, and countries contributing to this field in terms of publication?

RQ3 What are the most co-cited articles and most cited authors, countries, and articles?

RQ4. What are the most used and trending keywords?

RQ5. What are the collaboration patterns of different countries in terms of publication?

Objective

1. To assess the trends in publication volume, growth, and pattern.
2. To identify the most influential sources, affiliations and countries contributing to this field.
3. To identify and analyze the most cited author, country, articles, and co-citation analysis.
4. To assess the most used and trending keywords.
5. To examine the collaboration network analysis.

This paper is organised into five sections. The next section explains materials and methods. Section 3 represents the data analysis and Section 4 summarises and discusses the findings. The final part concludes the paper with limitations and suggestions for future investigation.

Methodology

Method

This study uses bibliometric tools, including scientific mapping and performance analysis, to better understand the growth of technology innovation in economic growth. Bibliometrics is a sub-branch of informatics that measures the influence of scientific publications and the degree of knowledge distribution associated with them with the help of statistical tools. This allows for more data to be investigated by researchers while maintaining a high standard of rigorousness, scientific reliability, transparency, and repeatability compared to systematic literature studies (Forliano et al., 2021).

Database selection

Scopus has a significant number of excellent, peer-reviewed publications (Heradio et al., 2016; Shen and Ho, 2020; Shweta and Arora, 2024). Due to its thoroughness, frequent updates, and flexibility to support bibliometric analysis, the Scopus database is used to search pertinent literature on the topic of “technology innovation in economic growth” (Shafi et al., 2024). The literature searches and study selection procedures were carefully carried out to ensure that relevant articles were included and that publications that were not contributing to our research goals were excluded. The data was retrieved from the Scopus database on 2 September 2024.

Data extraction

To gather the data from the Scopus database, the search field contained the keywords like "Technology Innovation” AND “Economic Growth”. Search queries were refined using boolean operators to ensure that relevant papers were retrieved. The search was conducted within title, abstracts, and keywords. The initial search revealed 615 documents without filtration. Then, the Scopus data were exported in CSV format so that they could be further examined in the R environment with the use of the "bibliometrix" library package (Jain et al., 2023).

Data screening

In this step, the findings from the preceding phase were refined. Search's inclusion criteria of this study were restricted to final articles that have been published in journals with peer review. Only English-language publications were included in our analysis. Publications published in languages other than English, Review papers, book chapters, newspaper pieces, conference proceedings, editorials, letters, and surveys were not included for further analysis.435 articles were collected after being refined based on inclusion and exclusion criteria. Further, data was limited to 2010 to 2024 and remained with 414 articles. An open-source program called the bibliometric R-package was performed on the final data. To analyze the data, we extracted a CSV file from Scopus and imported it into the biblioshiny interface of bibliometric R-package. Performance analysis and science mapping were the two approaches that were employed in this study.

Result and Discussion

Descriptive analysis

An extensive summary of the documents that were retrieved from the Scopus database is shown in Table 1. There are 414 articles published between 2010 and 2024. It suggests that the use of economic growth in association with technology innovation is a relatively new phenomenon. These articles are written by 971 authors and published in 168 different reputed journals. The average number of citations received by a document is 29.54. The annual growth rate of publication in this research area is 28.91%, while international co-

authorship accounts for 29.71%, indicating the increasing interest of researchers in this field.

Table 1. Descriptive Information.

Descriptive Information	
Timespan	2010:2024
Documents	414
Sources	168
Document Average Age	2.97
Annual Growth Rate	28.91%
Average Citation per doc	29.54
References	24496
Keywords Plus	1548
Author's keywords	1193
Authors	971
Single authored docs	45
Authors of single-authored docs	42
International co-authorships	29.71%

Publication Trends

Scientific Production over the years

Figure 1 shows a general upward trend in the annual number of papers published. This study considered articles published from 2010 to 2014, spanning 15 years. In the initial ten years, less than twenty articles have been released per year. There was a noticeable rise over the next five years, but the growth rate will remain modest. During 2022, there was a significant rise in publication. The number of articles produced in 2022 doubled that of the number of papers produced in 2021. Based on the data, the year 2023 had the greatest number of publications (118), accounting for 28.5 % of all the studied papers. The total number of publications released in 2023 surpassed the total number published before 2020 (115). Of all papers, 72.22% of articles were published between 2021 and 2024 only (Table 2). These statistics highlight that this field has recently started gaining popularity and is an emerging topic. It also offers a lot of scope for future research.

Countries-wise production

Various countries have contributed to the research field related to technology innovation and economic growth. Figure 2 represents the number of articles published by different countries from 2010 to 2024. It is observed that China has achieved significant growth than other countries such as Malaysia, Pakistan, Turkey, and the USA. Since 2019, China has experienced rapid and steep growth in the publication rate. Table 3 represents the total number of articles produced by the top 6 countries with a bifurcation of single-country publications (SCP) and multiple countries publications (MCP). China first ranks among the nations by publishing 259 articles, accounting for almost 62.56% of all publications. Out of which, they collaborated with other nations for only 58 papers. India has published 8 Scopus articles, representing 1.9% of total publications. A possible explanation for this trend is that China is more technologically advanced. In 2019, things have become more technology-driven during COVID-19, which might have caused a substantial increase in publications related to this after 2019.

Table 2. Year-wise publication.

Year	Articles	Percentage
2010	2	0.48%
2011	5	1.21%
2012	7	1.69%
2013	8	1.93%
2014	11	2.66%
2015	5	1.21%
2016	10	2.42%
2017	14	3.38%
2018	12	2.90%
2019	20	4.83%
2020	21	5.07%
2021	37	8.94%
2022	74	17.87%
2023	118	28.50%
2024	70	16.91%

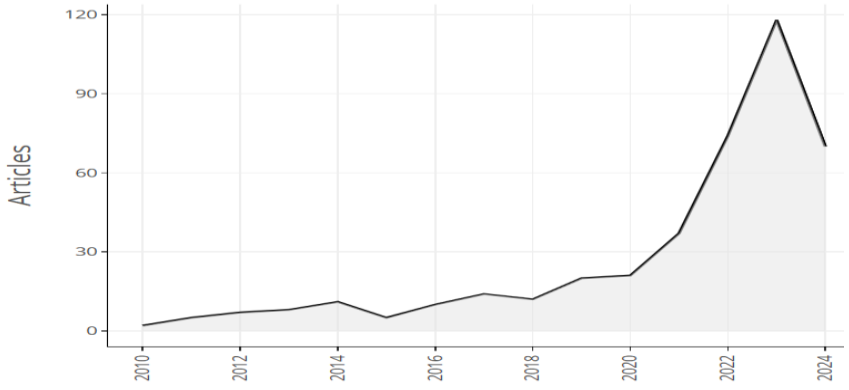

Figure 1. Figure 1. Publication Pattern over the Year.

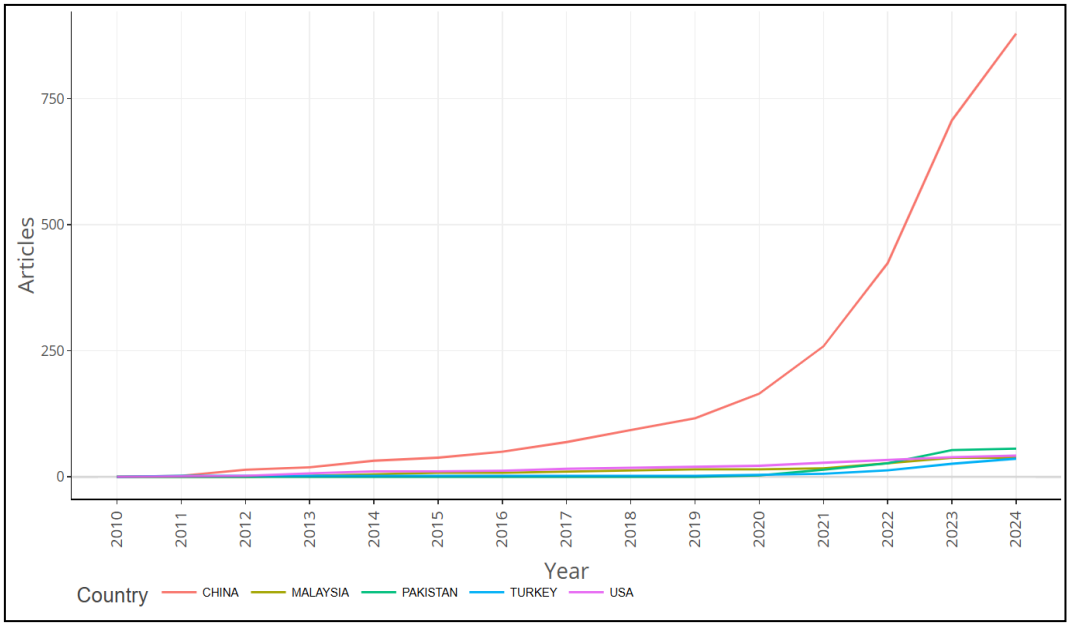

Figure 2. Country's contribution over the year.

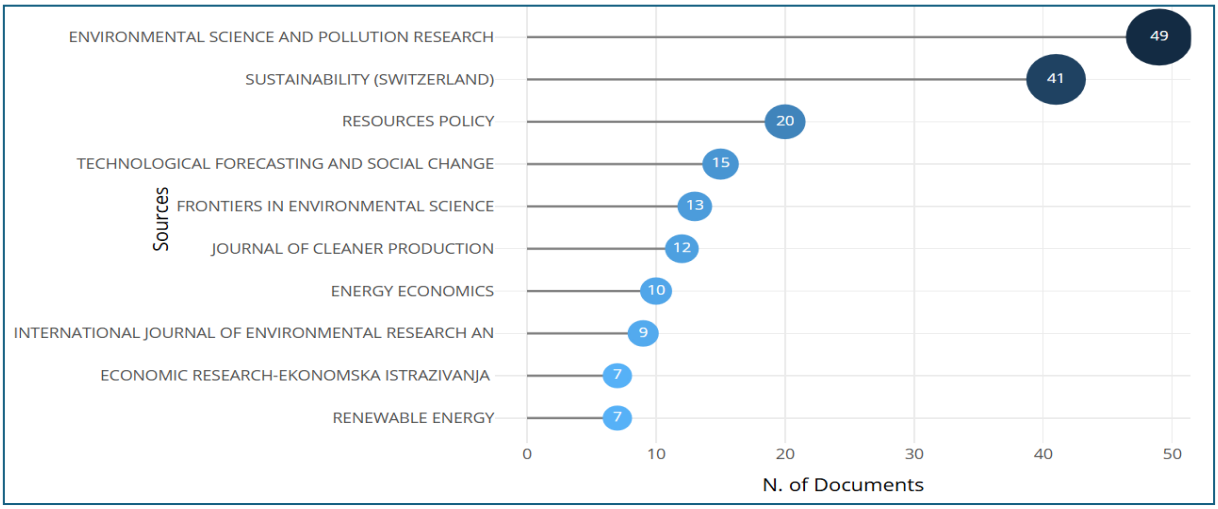

Figure 3. Most Relevant Journal.

Table 3. Country's total production.

Country	Articles	SCP	MCP
China	259	201	58
USA	10	6	4
India	8	6	2
Malaysia	8	3	5
Japan	7	6	1
Turkey	7	3	4

Source and Affiliations wise production

To precisely identify and make use of the most relevant sources, it is imperative to ensure the study's strength and trustworthiness using a thorough bibliometric analysis. In this instance, the term "most relevant sources" refers to a careful selection procedure where publications found in prestigious databases such as Scopus were picked based on their direct relevance to the study. The top sources for publications about Technology innovation and economic growth are shown in Figure 3. The "Environmental Science and Pollution Research" secured the top spot by contributing 49 articles, closely followed by the "Sustainability (Switzerland)" with 41 articles. A number of articles published in these two journals account for 21.73% of all papers in this study. All sources mentioned earlier are Scopus-indexed, demonstrating their dedication to producing high-quality research. These respected publications provide valuable information on this topic's most recent and important material. Table 4 lists the top 10 institutes associated with the authors who have contributed to this field. All the institutes listed in the table are situated in China. Jiangsu University and Xinjiang University are the prominent contributing institutes with 36 and 22 articles, respectively. This data is essential for resource allocation, facilitating more effective literature searches, and guaranteeing that the chosen sources accurately reflect the larger academic community.

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Table 4. Most Relevant Affiliations.

Affiliations	No Of Articles
Jiangsu University	36
Xinjiang University	22
Zhongnan University Of Economics And Law	18
Shandong University Of Finance And Economics	17
Sichuan University	17
Xiamen University	17
Hohai University	14
Beijing Forestry University	13
China University Of Geosciences	12
Lanzhou University	12

Citation analysis

Most cited authors and countries

The list of the most productive researchers in this field is displayed in Table 5. The first-ranked author is the one with the highest citations and so on. Sharif A is the most prolific author in this field with 1131 Citations, followed by Lin B with 680 citations. While Liu J is the most prominent contributor because he has published the highest number of publications (9) and got the highest g-index (9). These findings emphasize authors' outstanding production, impact, and influence in this field (Table 5). The top 10 countries that have received the highest citations are presented in Table 6. China has contributed the most in this field by getting total citations of 8234 and average citations of 31.79. Malaysia secures the second position with 465 total citations and 58.13 average citations.

Table 5. Top 10 Authors.

Authors	Tc	Np	G-Index	H-Index
Sharif A	1131	7	7	7
Lin B	680	6	6	5
Khan Sar	597	3	3	3
Li J	590	8	8	5
Abbas J	576	2	2	2
Ma R	542	2	2	2
Razzaq A	535	6	6	5
Du K	520	1	1	1
Liu J	517	9	9	5
Jermsittiparsert K	450	3	3	3

Top 10 cited documents based on global citations

With an emphasis on total global citations, Table 7 presents a collection of the most prominent articles about the role of technology innovation in economic growth. The work that has received the greatest citations (520) is titled “Towards a green world: How do green technology innovations affect total-factor carbon productivity”, published in the prestigious journal Energy Policy in 2019. Another article titled “The Role of Digitalization on Green Economic Growth: Does Industrial Structure Optimization and Green Innovation Matter?” from the esteemed Journal of Environmental Management is the second most cited paper. These papers offer knowledge and perspectives that greatly advance the topic of technology innovation and economic growth.

Table 6. Most cited countries.

Country	TC	Average Articles Citations
China	8234	31.79
Malaysia	465	58.13
USA	340	34.00
Japan	315	45.00
Cyprus	243	60.75
Italy	219	73.00
Mexico	181	90.50
India	175	21.88
Turkey	175	25.00
Germany	141	70.50

Co-citation network of publication

A co-citation network connects papers that are often cited together, exposing relationships, key topics, and trends in the field (Loyal and Chen, 2022). Co-citation counts are shown by the line thickness, which is correlated with the article's relevance. The high density of this network reflects the amount of attention technology innovation and economic growth has gotten from diverse scholarly sources. Interestingly, (Alvarez-Herranz et al., 2017) from red cluster (Du and Li, 2019) from the blue cluster (Shan et al., 2021) from the green cluster stands up as one of the most often cited articles with other publications (Figure 3).

Keyword Analysis

Trend Topics

Integrating "Trend Topics" analysis into bibliometric analysis aims to give academics and researchers dynamic and visually engaging insights to investigate the developing themes and patterns within a particular field of study. Through the use of sophisticated bibliometric methodologies, the analysis finds and emphasizes the most relevant and popular topics in the academic literature, allowing users to remain up to date with the most recent advancements in their specific fields of study. This analysis helps researchers grasp the present intellectual environment, uncover rising areas of interest, and highlight major issues driving research discourses. Figure 5 shows recent trend themes of 2023-2024 includ-

ing green technology innovation, renewable energy, and sustainable development. These are emerging topics. This highlights the importance of more research and discussion in this area.

Table 7. Top 10 Most Cited Research.

Rank	Title	Journal Name	Year	Country	TC	DOI	References
1	"Towards a green world: How do green technology innovations affect total-factor carbon productivity."	Energy Policy	2019	China	520	10.1016/j.enpol.2019.04.033	(Du and Li, 2019)
2	"The role of digitalization on green economic growth: Does industrial structure optimization and green innovation matter?"	Journal of Environmental Management	2023	China	315	10.1016/j.jenvman.2022.116504	(Hao et al., 2023)
3	"Green technology innovations, urban innovation environment and CO2 emission reduction in China: Fresh evidence from a partially linear functional-coefficient panel model"	Technological Forecasting and Social Change	2022	China	296	10.1016/j.techfore.2021.121434	(Lin and Ma, 2022a)
4	"Green technological innovation, green finance, and financial development and their role in green total factor productivity: Empirical insights from China"	Journal of Cleaner Production	2023	China	288	10.1016/j.jclepro.2022.135131	(Jiakui et al., 2023)
5	"Investigate the role of technology innovation and renewable energy in reducing transport sector CO2 emission in China: A path toward sustainable development"	Sustainable Development	2021	China	262	10.1002/sd.2167	(Godil et al., 2021)
6	"Exploring the nexus of electricity consumption, economic growth, energy prices, and technology innovation in Malaysia"	Applied Energy	2013	Malaysia	258	10.1016/j.apenergy.2012.10.061	(Tang and Tan, 2013)
7	"How does digital finance influence green technology innovation in China? Evidence from the Financing Constraints Perspective"	Journal of Environmental Management	2022	China	246	10.1016/j.jenvman.2022.115833	(Lin and Ma, 2022b)

8	"Research on the impact of green finance on the upgrading of China's regional industrial structure from the perspective of sustainable development"	Resources Policy	2021	China	238	10.1016/j.resourpol.2021.102436	(Wang and Wang, 2021)
9	"The role of technology innovation, renewable energy, and globalization in reducing environmental degradation in Pakistan: A step towards a sustainable environment"	Renewable Energy	2021	Pakistan	222	10.1016/j.renene.2021.05.101	(Chien et al., 2021)
10	"Assessing the digital economy and its carbon-mitigation effects: The case of China"	Energy Economics	2022	China	216	10.1016/j.eneco.2022.106198	(Wang et al., 2022)

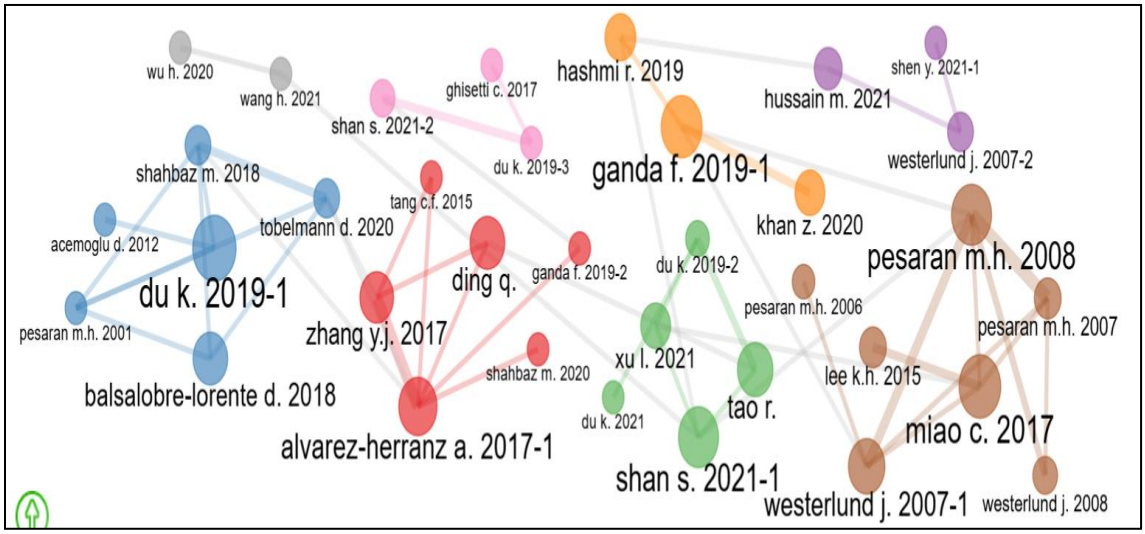

Figure 4. Co-Citation Network.

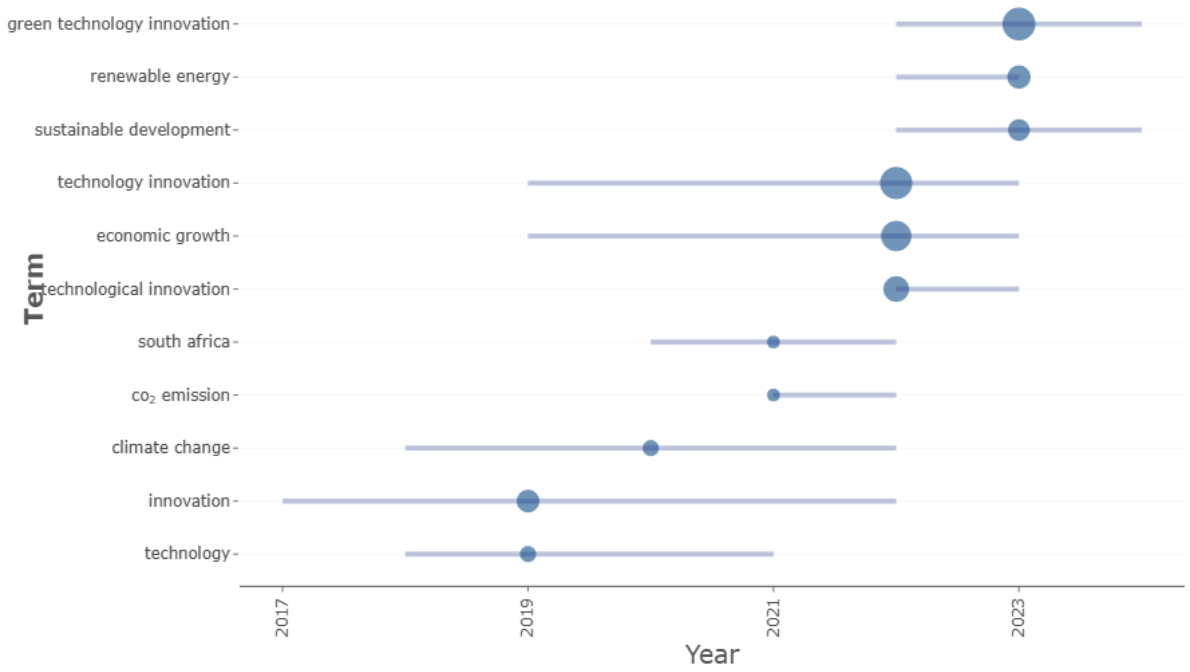

Figure 5. Trend topic.

Most frequently used Keywords

An examination of a tree map that sequentially presents bibliometric data is shown in Table 8. The organized rectangles in this tree map are used to represent the findings about categories or subsets of data; the size of each rectangle is a quantitative indicator of the frequency of a particular word used in the literature. A word's importance is shown by the size of its rectangles, which vary according to the frequency of the term within the map. The treemap more effectively displays the hierarchical links between concepts, allowing for a deeper comprehension of the structures and patterns found in academic literature. The results indicate that China is the most used keyword in this field, contributing 10% of the total keywords used, followed by Economic Development, Innovation, and Economic Growth, contributing 7%. On the other hand, The least used keywords are energy utilization, industrial resources, and pollution.

Table 8. Most Used Keywords.

SN	Keywords	No	%	S.N	Keywords	No	%	SN	Keywords	No	%
1	china	258	10%	18	investments	43	2%	35	industry	26	1%
2	economic development	189	7%	19	alternative energy	38	1%	36	industrial economics	25	1%
3	innovation	189	7%	20	green technology	38	1%	37	climate change	24	1%
4	economic growth	175	7%	21	environmental protection	37	1%	38	environmental policy	24	1%
5	carbon dioxide	116	4%	22	panel data	37	1%	39	environmental regulations	24	1%
6	sustainable development	111	4%	23	renewable energy	37	1%	40	human	23	1%
7	technology innovation	80	3%	24	sustainability	37	1%	41	city	22	1%
8	economics	73	3%	25	technology	37	1%	42	investment	22	1%
9	carbon emission	68	3%	26	emission control	35	1%	43	regression analysis	22	1%
10	environmental technology	66	2%	27	invention	35	1%	44	government	21	1%
11	environmental economics	64	2%	28	technological innovation	35	1%	45	humans	21	1%
12	economic and social effects	63	2%	29	inventions	33	1%	46	natural resource	21	1%
13	carbon	62	2%	30	economic analysis	30	1%	47	cities	19	1%
14	engineering research	54	2%	31	energy efficiency	29	1%	48	industrial structure	19	1%
15	technological development	53	2%	32	finance	29	1%	49	pollution	19	1%
16	economic growths	48	2%	33	article	27	1%	50	energy utilization	18	1%
17	green economy	46	2%	34	green technology innovation	27	1%				

Country's Collaboration Network

International collaboration is essential in bibliometric analysis to identify the interrelated network of research activity across nations. The collaborative network is represented graphically in Figure 6, with directed edges representing the interchange of research collaborations and different shades of blue representing nations' productivity. A nation's productivity increases with its darkness. The dark blue color indicates the country has produced the highest number of articles in this field, while the grey color signifies no significant research output contributed by that country. The connecting red lines indicate the collaboration between the countries. The most robust line indicates the significant involvement in collaboration by countries, which shows that China leads in this research collaboration by publishing the highest number of articles in collaboration with Pakistan (31), followed by the USA (14), Turkey, and the UK (8).

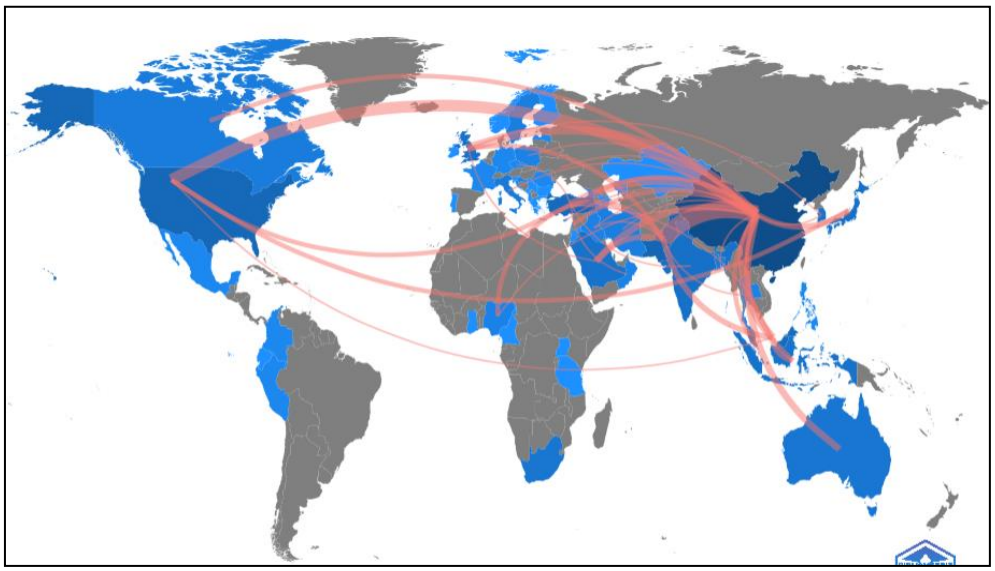

Figure 6. Collaboration Network.

Discussion

The number of research papers examining the role of technology innovation in economic growth has significantly increased during the last 15 years. The exponential rise, which began with 2 papers in 2010 and reached a noteworthy 118 in 2023, clearly demonstrates the growing interest in and commitment to researching the connection between technology innovation and economic growth. The noteworthy rise in scientific production is evidence of the rapid advancement of technology and the growing recognition of technological innovation to increase economic growth. Similar exponential growth trends have been observed in several different sectors, which can be linked to technological breakthroughs and a rise in interdisciplinary collaboration (Appiah-Otoo, 2023; Dahiya et al., 2022; Jain et al., 2023; Shweta, 2024). It is clear from assessing the state of research on technology innovation and economic growth that many nations have made substantial contributions to the advancement of this area. China is leading the way in terms of research production, citation effect, and collaborative efforts. A well-developed research infrastructure and an environment that fosters cooperation and innovation. These findings support earlier bibliometric analyses that show a link between research production and impact, emphasizing the significance of powerful nations in defining scientific areas (De Moya-Anegon et al., 2018; Shafi et al., 2024). The patterns of international collaboration highlight the interdependence of research endeavors in the field of technology innovation and economic development. A global network of information sharing is demonstrated by the broad collaboration, which includes the collaboration of China with Pakistan, the USA, the UK, and Turkey. These collaborative strategies enable the convergence of disparate knowledge, resources, and perspectives. This is consistent with other research demonstrating the benefits and outcomes of global collaboration in scientific research, emphasizing the combined strength and influence of collaborations (Shafi et al., 2024).

The “Environmental Science and Pollution Research” and “Sustainability (Switzerland)” have emerged as significant sources for publishing research on the usage of technology innovation in economic growth. Specific journals are notable sources that impact the discourse and distribution of research within this academic subject. Previous studies have highlighted the role that prestigious journals have in setting the direction of research and creating a strong scientific community, both of which are essential for advancement in certain fields of study (Mittal and Jora, 2023).

The prolific authors are major players in the information flow, and their contributions significantly influence the research environment. In the field of research, authors are essential since they generate a significant quantity of work and make significant contributions that have a quantifiable influence. Sharif A is found to be the most prolific author in this field with 1131 Citations, while Liu J is the most prominent contributor because he has published the highest number of publications (9) and got the highest g-index (9). Their portfolio would include a wide range of literature related to technology innovation for understanding economic growth, demonstrating their noteworthy contributions to advancing the field of research. This highlights the importance of their work in driving research agendas and fostering innovation. These findings align with previous research, highlighting the author's important role in disseminating information and significant contribution to

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enhancing knowledge in relevant fields (Kumar and Sudhakar, 2024). In the future, the impact of specific technological innovations such as Generative AI, E-vehicle, blockchain technology, fintech, 3D printing, etc, on economic growth could be explored. The recent results reveal a substantial role of technological innovation in the economic growth of a country. We have incorporated several helpful examples to highlight the practical applications of technology innovation in economic growth.

The results of our bibliometric study, particularly the prevalence of terms like "China", "Economic development", "Innovation," and "Economic growth," point to an interesting trend in the application of technology innovation in economic growth. These are the keywords most commonly used in this field, highlighting the significance of China in promoting economic growth through technological innovation. The trending topic used by the author revealed that green technology innovation, renewable energy, and sustainable development are emerging topics that offer a landscape for future research in this area. The study has comprehensively analyzed the related literature and highlighted the most relevant authors, articles, countries, affiliations, sources, and keywords. This finding offers guidance to the scholar for future research.

Conclusion

This study concludes by doing a comprehensive bibliometric analysis on the topic of technology innovation, concentrating on its importance for the economic development of a country. The study analyzed 414 data from the Scopus database using a range of bibliometric indices and visual aids. The research findings shed light on several important facets of the research environment, such as the important documents, authors, sources, country, renowned affiliation, trending keywords, collaboration network, and citation analysis. Most of the articles in this field have been published in the "Environmental Science and Pollution Research" journal. A paper titled "Towards a green world: How do green technology innovations affect total-factor carbon productivity" and author named "Sharif A" received the highest number of citations. Jiangsu University and Xinjiang University are the prominent contributing institutes in terms of publications. The future researcher interested in this field can find the most relevant information from these sources. China emerges as most leading country in this field. It has published the highest number of articles every year and showed significant growth in publication rate. It also has the highest publication in collaboration with other countries. Furthermore, China is the most cited country. There is a significant difference in the number of publications published by China (259) and other countries (10 or less). These results indicate that there is a lot of scope for research in this field by other countries. This study aims to offer researchers valuable guidance in identifying key issues and efficiently addressing gaps in their research. This study recommends that policymakers and concerned authorities make effective policies and focus on infrastructure development to support technological innovation. This will contribute towards the economic growth of a country.

Limitations and future scope of research

Several methodological limitations to this study could be resolved in further research. This research was based on examining a single database (Scopus), which constrained the article's sectoral coverage. Incorporating various sources such as WOS, IEEE, PubMed, PsycINFO, and Google Scholar would be more beneficial in future studies. Second, the inclusion of literature from sources other than academic journals such as novels, trade magazines, and conference proceedings, was not considered. Third, this study covers the articles published between 2010 to 2014 only. Publication patterns revealed that the role of technology in economic growth is a new and emerging field. This suggests that there is a lot of scope for conducting empirical research in this field. Recent trend topics include green technology innovation, renewable energy, and sustainable development. Future researchers can explore this area. Additionally, academics can add further mapping, including intellectual and structural mapping, for a better understanding. Finally, while the study offers a thorough overview of the research field, it does not provide the precise knowledge that more detail-oriented studies, such as systematic reviews or meta-analyses, may be able to provide. Notwithstanding these drawbacks, the study provides insightful information for scholars working in this area, who may consider these restrictions when designing future studies that address the possible goals suggested by the findings.

Conflict of interest

None

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